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An Educational Opportunity

By W. T. Read[1]

Growth of the students' courses at the Chemical Exposition. Demonstration and instruction. Suggestions wanted for this year's courses.

"THE Fourteenth Exposition of Chemical Industries will be held the week of December 4th at the Grand Central Palace in New York." ...

This announcement has a varied meaning to different members of The American Institute of Chemists, but to an important and growing group in our organization it recalls the part that these expositions play in the training of students preparing to enter the chemical profession.

The Institute has always taken a great interest in the training of students, not only through individual members concerning themselves with students of their acquaintance and with the educational policies of their own colleges, but also by the thorough investigation of the problems of these colleges by a committee of the Institute; and the purpose of this article is to report to our members what has been done in the past to make available the vast resources of the chemical expositions to students, and to enlist their support for the students' courses of the coming exposition.

At the outset it would be well to point out the educational resources of the exposition. Most colleges and universities do a certain amount of "inspection trip" instruction. Such trips have their place—and a very definite and necessary place—in the chemical curriculum. There are some objectives which are common both to plant trips and to study at a chemical exposition, and others which can only be accomplished by the latter. Chemical engineering equipment can best be seen when isolated, unconnected, and "dressed up and in the parlor." Small models are available; special parts are shown separately; and often there are cut-away sections and windows. Comparative study of various types of equipment in the same field is possible. The newest and latest developments are shown. Materials of construction are emphasized in a very special way. Raw materials, intermediates in every stage of production, and finished products are brought together. To

[1] Chairman, Students' Courses, Fourteenth Exposition of Chemical Industries.

quote a statement of the author made before the Division of Chemical Education of the American Chemical Society in 1931 in summing up the resources of a chemical exposition, "There are collected in one place and under ideal circumstances achievements of chemistry and chemical engineering which it would require months of time and thousands of miles of travel to see in chemical laboratories and plants."

In 1923 after having used the resources of three expositions for his own classes at Yale, the author was privileged to serve as chairman of the first students' course of the Chemical Industries Exposition. The first course lasted the entire week and consisted of a series of lectures each morning on unit chemical engineering operations and equipment and materials of construction. Afternoons and evenings were devoted to a study of the exhibits. There were examinations and reports covering the work of the week. The total enrollment was 115; and of this number about 75 remained the entire week and took the full course. In 1925 the attendance was 135, and very much the same sort of work was done. In 1927 two parallel courses were given, one for students just beginning their chemical studies, and the other for more advanced students. The attendance had reached 165.

Up to this time the exposition had been held in late September, when the colleges were either just opening or were yet to open, and it was easy for students to come. The change of date to May very seriously interfered with the 1929 courses, and the attendance dropped to 135. In 1931 the courses were changed to meet the new conditions. Instead of a full week of two parallel courses, three consecutive two-day courses were offered, the first for beginners in chemical engineering, the second for advanced chemical engineers, and the third for students of chemistry. Every student who entered the doors of the exposition registered separately and answered on his card a number of questions. The records at the end of the week of May 4, 1931 showed 585 who indicated that they were taking some part in the exposition courses, most of them attending the morning lectures or studying the exhibits as a part of regularly required work in charge of an instructor. Over 2300 viewed the exhibits in the capacity of students. Nearly 50 different institutions were represented.

A GLANCE over the programs of the various student courses will reveal the names of men who are leaders in the profession. On the staff of the 1931 course were four editors of chemical journals, two directors of research institutions, and nine teachers of chemical en-

gineering, as well as several distinguished chemists and chemical engineers from industry.

What students get from such exposition courses is much more than information, however valuable that may be. They get an impression of the vast diversity, range, and scope of the applications of principle to large-scale production. They meet and hear men who can speak authoritatively of things concerning the chemical profession. They feel subtly complimented and thrilled at "being admitted to the great fraternity of those who make chemistry their main business in life." The inestimable value of intangibles must not be overlooked.

The plans for the courses in December are in the formative stage as this article is written. The institutions represented at the last exposition have been asked to give their impressions and suggestions. A special advisory committee, which includes an official representative of the Institute, is to pass on the general plans for the course, and speakers will be selected in October. An intensive campaign will then be begun to interest the colleges and universities that have so far not been represented. Every effort will be made to improve the service already rendered, particularly in the way of individual instruction of small groups at the exhibits.

The American Institute of Chemists can play a very important part in the coming educational work of the Fourteenth Exposition. We are an organization based on the welfare and advancement of the individual in the profession. No greater service can be rendered than to the men who are just beginning their careers in chemistry. If the members of the Institute believe that there is educational value in the exposition, they are invited to help those who are conducting the courses, so that the students may realize to the utmost all that can be got from what is said and shown. It is a matter not only of advice and suggestions, but also of finding out what each member's college or university is doing in the way of making these courses available to its students. There have been chemical fraternity dinners in the past, and there should be more of them. There are alumni dinners at the national meetings of the American Chemical Society. There should be the same dinners during exposition week, where students, faculty, and alumni can meet and talk over the chemical affairs of their institutions. The personal touch is desirable and necessary; and no organization should pay more attention to the personal touch than The American Institute of Chemists.

The Chemist to the Aid of the Consumer

By Russell C. Erb

Has the chemist benefited by allying himself with industry? Danger of losing professional identity. Consumers' research as an Institute function.

CHEMISTS are becoming more closely allied with industry; and this fact is being interpreted as a symbol of industrial and scientific progress. In a practical world such as ours, scientific organizations welcome this industrialization of science. No one doubts the benefits to industry that accrue from the thorough utilization of the service of the chemist.

We raise the question, however, whether or not the science of chemistry is properly nourished by this apparent coalition with organized industry. Close alliance between chemistry and industry may sometime result in the complete absorption of chemistry by industry, and the professional status of the chemist may be lost. The chemist, in the eyes of the public, may become a tradesman, necessary in industry to the same extent as the machinist or other skilled workers.

Popularly considered, professional men must be of service to the general public. Professional men cannot confine their services to a chosen few or to a select group and still maintain their professional identity. We find general practitioners in the professions of law, medicine, pharmacy, etc. It is unusual to find a chemist or chemical engineer offering his services and knowledge to the general public. Chemistry will never be put on a plane with law, medicine, and pharmacy; but it can and should be made more utilitarian.

We are being urged to do more buying, and we infer that those who do the urging mean wise buying. Promiscuous buying, just for the sake of buying, will not cause national recovery from depression sickness. Wise buying is becoming more and more difficult. The consumer is bombarded with fantastic claims for this and for that, and he is at a loss as to whether to buy that or this. Science, because of its close alliance with industry, is lending scientific terms to industry, and industry is putting these terms into advertising copy. "Science says this"—and old man public believes it and buys.

Chemists should aid the consumer by furnishing the consumer with data on the composition, properties, and relative value of the various commodities on the market. A good attempt at such a service has been made by the American Medical Association. If the American Medical Association says "okeh," a product gets a seal of approval. Just what their seal of approval stands for is somewhat doubtful, but at least it means that the tooth paste that has it will not burn your tongue and the jar of jelly with the American Medical Association approval does not contain enough arsenic to kill you. The American Medical Association seal of approval does not necessarily indicate that the product you are buying is worth the price you are paying for it. A small bottle of antiseptic mouth wash with an American Medical Association seal may cost a fraction over four cents and still be retailing at 75 cents. A 115-cc. bottle of a "skin lotion" was evaluated at half a cent and was selling at 85 cents per bottle.

IT MIGHT be well for The American Institute of Chemists to go one better than the American Medical Association by organizing a Consumer's Service for the purpose of advising the consumer as to the relative values and merits of various items of purchase and in that way aid the establishment of fair industrial competition. A service such as this should be conducted on an entirely fair and impartial basis, free from industrial and advertising influences and not of a confidential nature for the consumer.

The consumer wants to know. He wants advertisements translated for him. He wants to know when he is paying fifty cents for a preparation containing one-half penny-worth of salt. He wants to know if it is true that you can do better with dated coffee. He wants to know if it is true about the gas and oil he uses in his car. He still is in doubt about the use of aluminum for cooking purposes. But to what legitimate organization can he look for truthful advice? And what organization can ever have the consumer's confidence as completely as would a disinterested professional group?

The American Institute of Chemists stands for clean and entirely ethical practice in all professional and industrial spheres of activity. They should take an aggressive stand on practices involving selling and buying. Without asking for it, the consumer has all types of advertising statements hurled at him. Without asking for it, he should likewise have the truth given to him concerning the various brands of merchandise. The American Institute of Chemists may be the logical organization for this dissemination of truth.

AS AN illustration, we might take the products classed as cosmetics. Cosmetics do not come under the control of the government in the antiquated Food and Drug Act. Manufacturers have absolute freedom in marketing any concoction under any claims they see fit to make. Creams and powders may contain "any old thing" and still be thought helpful, healthful, and an absolute necessity by the misinformed public. Soaps with medicinal odors may not be worth the paper they are wrapped in, and still the public is told how efficacious they are for various bodily ailments. Antiseptic mouth washes, the public is told, are needed to ward off disease because they kill all the germs in and about the tonsils. Salt manufacturers would do well to advertise their product—for the antiseptic value of salt is far above many of our higher-priced mouth washes.

And so, we might go on mentioning products—foods, paints, tobaccos, gasolines, motor oils, anti-freeze preparations, building materials—all of which have conflicting claims as to brands, etc.

A member in our social order looks to the physician in matters pertaining to his health; to the clergy in matters pertaining to his moral life; to the lawyer in matters involving his legal rights. Make it possible for him to look to the chemist in matters pertaining to the buying and use of the numerous products on our market.

We believe that The American Institute of Chemists would do well to sponsor this service for the consumer.

Chemistry at Tech

By Tenney L. Davis

The growth of a new principle in teaching chemistry. History of the chemistry department at the Massachusetts Institute of Technology.

THE first printed catalog of the Massachusetts Institute of Technology, dated 1865–66, contains a passage, probably written by Professor Charles W. Eliot, which makes clear the intent of what was at that time a relatively new departure in chemistry instruction. "A high value is set upon the educational effect of laboratory practice, in the belief that such practice trains the senses to observe with accuracy, and the judgment to rely with confidence on the proof of actual experiment." The Institute opened on the principle that each student should experiment for himself in the laboratory. In due time it became apparent that another principle was also at work—that the teaching of the art of research is to be accomplished by the practice of it. By these two principles the history of the Institute's chemistry department is explained and summarized.

The Massachusetts Institute of Technology opened in 1865, the year after the *Bulletin* of the French Chemical Society commenced publication and three years before the *Berichte* made its first appearance. The American Chemical Society was founded eleven years later. Chemistry and chemistry instruction have changed greatly since those days. There were then no textbooks designed for laboratory use. Abstract journals and comprehensive libraries of reference did not exist, and much of the apparatus was then unknown without which we would now find it difficult to proceed. The water pump and suction filter, for example, were not yet standard laboratory equipment. The water pump, invented by Bunsen, was later improved by Robert Hallowell Richards, a member of the first class to graduate from the Massachusetts Institute of Technology, and became familiar in the laboratories of this country under the name of the Richards pump—a circumstance which serves, perhaps as well as any, to illustrate the changes which have occurred in laboratories and in laboratory instruction during the period which has elapsed since the Institute was established.

In February, 1865, the Institute opened its preliminary course and held its first classes in a building at 16 Summer Street, Boston, about opposite the present location of C. F. Hovey and Company. There were fifteen students and six professors. Francis H. Storer had charge of chemistry. When the fall term opened in October, the faculty had been increased to ten. There were two chemists; Storer was professor of general and industrial chemistry, and Charles W. Eliot was professor of analytical chemistry and metallurgy. Both of these men had attended the first classes and had been assistants in the first laboratory courses of Josiah Parsons Cooke, Jr., who had introduced regular laboratory instruction in chemistry for undergraduates of Harvard College in 1858. "These two young professors," as Eliot later wrote, "were soon called on to plan and equip the chemical laboratories in the Institute's new building on Boylston Street. These laboratories were planned for teaching chemistry to all students, young or old, beginners or adepts, by the laboratory method. In these convenient and spacious laboratories Professors Storer and Eliot were soon experimenting not only on the students of the Institute but also on classes of teachers, both men and women, employed in schools in and about Boston."

The Institute's first catalog announces for the first year two courses in the elements of inorganic chemistry, the first on the non-metallic elements, the second on the metals. "In both of these courses, the principles of chemical nomenclature and classification, and the more striking facts in the history of the elements and the present state of chemical theory, will be dealt upon at such length as is consistent with the general character of the lectures; but special attention will always be given to those substances and processes which are of importance in common life or in the useful arts. Practical instruction in chemical manipulations will also be given in the laboratory to every student. This series of lessons will include practice in the construction and use of apparatus for preparing and experimenting with the common gases, acids, bases, salts, etc., which have been described in the lectures." The catalog also announces a course in qualitative analysis for the second year, courses in industrial chemistry including mineralogy and metallurgy for the third and fourth years, and evening classes at the Lowell Institute "open to students of either sex, free of charge—'A Course of Eighteen Lectures on the Chemistry of the Non-metallic Elements,' by Prof. Storer, on Mondays and Fridays, at 7½ P. M.—'A Course of Eighteen Lectures on the Chemistry of the Metals,' by Prof. Eliot—beginning when Prof. Storer's course closes." In the following year, 1866–67, the two professors gave at the Lowell

Frank Leslie's Illustrated Newspaper

EVENING CHEMISTRY CLASS OF THE LOWELL INSTITUTE, IN THE M.I.T. LABORATORY

Tech is now coeducational, about one per cent of all the students being women. The professor in the left foreground is Charles W. Eliot.

Institute a course of "Thirty Practical Lessons in Chemical Manipulations."

The second catalog indicates an expansion of the chemistry courses. Cyrus M. Warren, pioneer in the industrial development of coal tar, had been appointed professor of organic chemistry and gave a course of lectures in that subject which followed the qualitative analysis of the second year. In the third year, quantitative analysis was given, lectures on industrial chemistry, and descriptive and determinative mineralogy; in the fourth year, more quantitative analysis, the preparation of chemical products, and special researches. In describing the first year chemistry this catalog says—"In his laboratory work, the student will use a textbook, in which all needed directions to secure safety and success in performing the experiments are minutely given." This was the famous textbook of Eliot and Storer, "A Manual of Inorganic Chemistry Arranged to Facilitate the Experimental Demonstration of the Facts and Principles of the Science."

ELIOT and Storer's textbook was the first of its kind in the English language, perhaps the first textbook in any language designed for the use of students who should carry out the experiments themselves. After the manuscript had been put in type, the authors used the proof

sheets in their classes for a year and in this way discovered certain errors and defects, and were able to make improvements in the revised edition. The story goes that each co-author wished the other's name to stand first on the title-page. A penny was flipped, and Storer claimed that Eliot won. Neither name stands above the other on the title-page; they are on the same line, Eliot's first. On the back of the binding of the first edition (1867), the initials, E and S, are combined in a monogram in such manner that it is impossible to know which letter ought to be read first. On that of the second edition (1868), the names of Eliot and Storer are printed in full but crossed so that neither appears before the other. The "Compendious Manual of Qualitative Chemical Analysis" of the same authors was first used, in the proof sheets, by the second-year class in the fall of 1868. Both works appeared in later revised editions and remained standard texts until about the end of the nineteenth century.

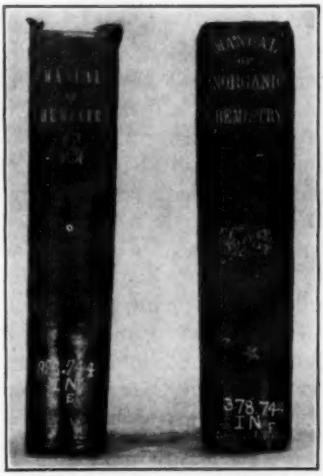
In 1869 Eliot left the Institute to become president of Harvard University. Storer followed him to Harvard a year later and became professor of agricultural chemistry and, in 1871, Dean of the Bussey Institution. He continued in both positions until his retirement in 1907.

The first class to graduate from the Institute, in 1868, consisted of fourteen students, none of them graduating in chemistry, six in civil engineering, one in general science, one in mechanical engineering, and six in mining engineering and metallurgy—but the latter had received a considerable portion of their training in the department of chemistry. One of them, Robert Hallowell Richards, remained at the Institute as assistant in general chemistry and became assistant professor of analytical chemistry in 1870. In 1871 he left the chemistry department to take charge of the mining and metallurgy laboratory, and from 1873–1914 was head of the mining department. His reputation in his specialty is well known, and his work on "Ore Dressing" is a classic. His wife, Ellen H. Swallow Richards (M.I.T. 1873), was a member of the chemistry department from 1878 until her death in 1911. Here she did pioneer work in sanitary chemistry, in particular on the chemical analysis of drinking water.

The class of 1869 consisted of five students. One of them, William Ripley Nichols, was graduated in chemistry; and he returned to become a member of the instructing staff. He was associated with the Massachusetts State Board of Health for the investigation of a variety of sanitary problems, especially those relating to water supply and sewage, and it was in this field that his most important contributions were

made. His "Water Supply, Mainly from a Chemical and Sanitary Standpoint" was published in 1883. The next class, 1870, numbered ten students, one a chemist, N. Frederick Merrill, who later became professor of chemistry at the University of Vermont. There were two chemists among the seventeen students who graduated in 1871, three among twelve in 1872, and seven among twenty-six in 1873.

James Mason Crafts, whose name is well known to all students of organic chemistry because of the Friedel-Crafts reaction, came to the Institute from the newly organized Cornell University where he had been professor of chemistry and chairman of the chemistry department from 1867 to 1870. He succeeded Storer as professor of general and analytical chemistry and immediately devoted his energies, not only to routine teaching, but to the improvement of laboratory facilities and the encouragement of research. When Warren left the Institute in 1871, Crafts was made professor of analytical and organic chemistry. He used German textbooks in the latter subject and gave courses which became traditional for their thoroughness. In 1874 failing health compelled him to give up his teaching duties. He went to Europe, where he remained for seventeen years, during which time nearly a hundred papers bearing his name were published—those on the use of aluminum chloride in organic synthesis being published jointly with Friedel and those on the densities of the halogens at high temperatures and on thermometry independently or with other collaborators. Crafts returned to the United States in 1891, and in 1892 resumed the duties of professor of organic chemistry.



ONE OF THE EARLIEST LABORATORY MANUALS

Three years later, when Professor Drown[1] (1885–1895) was elected president of Lehigh University, Craft became acting head of the department but refused to accept the position permanently on the ground that

[1] In the present paper, the dates after a man's name indicate the years of his service in the chemistry department of the Massachusetts Institute of Technology.

he would be more useful by continuing his work in organic chemistry. He served as acting president of the Institute from January to October, 1897, and thereafter as president until 1900. He fostered a spirit of cooperation between the professor and the advanced student, and foresaw the development at the Institute of a graduate school devoted to research in pure science.

THOMAS Sterry Hunt, one of the most distinguished chemists of his time, was professor of geology from 1871 to 1878. Although he was not a member of the chemistry department, it seems impossible that he should have been without influence upon chemistry at the Institute. Let it be recalled that he was probably the first to define organic chemistry as the chemistry of carbon and its compounds. He stood on the advancing frontier of chemistry. He originated the theory of simple water types; and the germs of the ideas usually attributed to Gerhardt may be found in his earlier papers. His researches upon the equivalent volumes of liquids and solids were a remarkable anticipation of Dumas. He had definite and significant ideas on the real molecular complexity of mineral substances. Among his more practical achievements may be mentioned the invention and patenting, in 1859, of the permanent green ink which has found wide use in the printing of greenback currency. He was a charter member of the American Chemical Society and president of that organization in 1879 and 1888.

Lewis Mills Norton (1875–1893) in 1888 founded the course in chemical engineering, the first such course, we believe, to be anywhere established. In 1891 seven bachelor's degrees were awarded in chemical engineering, eleven in chemistry. Thereafter for twelve years the number of degrees in chemistry was greater than the number in chemical engineering (on the average about twice as great) until 1907, when fourteen degrees were given in chemical engineering and ten in chemistry. In 1908 there were fifteen in chemical engineering and sixteen in chemistry. From 1909 onward there have been more bachelor's degrees in chemical engineering than in chemistry. Much of the early success of the course in chemical engineering was due to the enthusiasm and skillful teaching of Frank Hall Thorp (1899–1916) whose "Outlines of Industrial Chemistry" was first published in 1898.

In 1908 the research laboratory of applied chemistry was organized under the directorship of William Hultz Walker (1894–1920), who in 1912 was also given charge of the course in chemical engineering. He retained both positions until 1920, in which year the single department of chemistry and chemical engineering was divided into two separate

departments. The department of chemistry remained for two years longer under the leadership of Henry Paul Talbot (1885–1922) who had been in charge of the joint department since 1907. Frederick George Keyes (1910–) is at present head of the chemistry department and director of the research laboratory of physical chemistry.

The first year of the membership of Arthur Amos Noyes in the staff of the chemistry department was the year in which the *Zeitschrift für physikalische Chemie* commenced publication. Noyes was graduated from the Institute in 1886, and remained for a year's study for the master's degree and for another year as assistant in general chemistry. He spent two years in Leipzig, where he was awarded the doctor's degree in 1890. He then returned to the Institute to engage in the teaching of analytical chemistry until 1892, of organic chemistry until 1899, and of theoretical chemistry until 1920, when he left us to become director of the Gates Chemistry Laboratory of the California Institute of Technology. His "Detailed Course in Qualitative Chemical Analysis with Explanatory Notes" first appeared in 1894, but he continued to work on the same subject and later developed a qualitative procedure capable of detecting the rare as well as the common elements, any or all of them in quantities as small as a single milligram. The "Laboratory Experiments on the Class Reactions and Identification of Organic Substances" by Noyes and Samuel P. Mulliken (1895–), first published in 1897, describes simple test-tube experiments selected to illustrate the principal types of organic reactions. Students who are preparing themselves for the doctor's examination in organic chemistry still find profit in studying it. It constitutes a sort of prolegomena to Mulliken's large treatise, "A Method for the Identification of Pure Organic Compounds by a Systematic Procedure Based on Physical Properties and Chemical Reactions," the first volume of which was published in 1904.

ABOUT the beginning of the century, notions based upon the ionization theory were introduced into the courses in analytical chemistry. "The Electrolytic Dissociation Theory" by Henry Paul Talbot and Arthur A. Blanchard (1899–), which first appeared in 1905, helped greatly at a time when discussions of the subject had not yet been written into the textbooks. Willis R. Whitney (M.I.T. '90, 1890–1904), for many years director of the research laboratory of the General Electric Company, was instructor in theoretical chemistry and proximate technical analysis from 1898 to 1900, and assistant professor of theoretical chemistry in 1903–1904. Noyes became professor of theoretical chemistry in 1899, and Arthur A. Blanchard and Miles S. Sherrill (1899–)

were the first members of the chemistry department to be listed as assistants in theoretical chemistry. The text, "Chemical Principles," by Noyes and Sherrill, was developed gradually; mimeographed sheets were used in class, then printed pamphlets for a number of years; revisions and additions were made, and the whole was finally issued as a book privately printed in 1920 and more recently as a book published in the regular manner. Brief and very clear discussions of each point are followed by problems in which the student is obliged to think his way to the center of the difficulty. "Chemical Principles" inaugurated a new method for the teaching of physical chemistry.

In 1903 the research laboratory of physical chemistry was organized with Noyes as director; and in 1907 the degree of doctor of philosophy was awarded to three of its students: Raymond Haskell, Robert B. Sosman, and Morris A. Stewart. This was the first time that the doctor's degree was awarded by the Institute. A list of those who have since graduated from the research laboratory of physical chemistry contains the names of some of the best known physical chemists in the country. Two hundred and ninety-one scientific papers from the laboratory had been published to the end of 1932.

The research laboratory of organic chemistry, organized in 1926 with James F. Norris (1895–1904, 1916–) as director, has published eighty-one papers. The research laboratory of inorganic chemistry, organized in 1930 under the directorship of Walter C. Schumb (1920–), has published twenty-four. The three laboratories for graduate research are housed in the new building of the George Eastman Research Laboratories which is to be dedicated in the spring of 1933.

THE present staff of the chemistry department consists of ten professors (of whom one is non-resident), seven associate professors, five assistant professors, sixteen instructors, five research associates, fourteen assistants, and seven research assistants. In the course of its history to June 1932, the Institute has awarded two hundred and fifty-three doctor's degrees (Ph.D. and Sc.D.); one hundred and nine of these have been in chemistry and, the next largest group, thirty-one, in chemical engineering.

The building of the George Eastman Research Laboratories constitutes one wing or section of the Institute group. It is devoted entirely to graduate research in chemistry and physics, and adjoins the wings in which the corresponding undergraduate subjects are taught. In the basement are constant-temperature rooms, etc., shops where students may construct needed apparatus, and at appropriate places throughout

Tech Photo Service

THE GEORGE EASTMAN RESEARCH LABORATORIES

the building are rooms for special apparatus: spectroscope, thermostats, ice machines, micro-combustion equipment, etc. On the ground floor a large lecture hall, the second largest in the Institute, is equipped for showing motion pictures and with other devices to facilitate the exposition of the results of experimental research.

On the second floor, between the chemistry section of the building and the physics section, is a combined library of chemistry, physics, and mathematics, and on the third floor the beautiful and comfortable Forris Jewett Moore Room, in memory of F. J. Moore (1894–1925) whose "History of Chemistry" (1st ed. 1918) is familiar to most American students. In this room department conferences take place, graduate students gather for an occasional soirée, and here recently the Harvard-Technology Chemical Club has been holdings its meetings. Our creed is carved on the mantel over the fireplace in the office of the director of the chemistry department—*Felix qui potuit rerum cognoscere causas*. And now in the new laboratories, with better facilities and in more attractive surroundings, we continue to engage in the happy business of seeking a better understanding of some of the aspects of Nature.

Code Suggestions

By H. P. Trevithick

Fitting the routine analyst into a code. A suggested scale of salaries. Insuring the professional standing of chemists who make reports.

A NUMBER of NRA codes have been suggested for the chemist: one for consulting chemists, one for food chemists, one for laboratories in general, etc. None of those which have come to the attention of the writer, seem to remove the special difficulties in the commercial laboratory field. This field covers the analysis of raw materials or intermediates entering into manufacturing, and analysis of the finished products.

One of the difficulties in this field is the analyst who is not a trained chemist but who has been taught to run certain tests by a chemist. Such a man may be an expert in manipulating the several analyses on which he has been trained. He very probably can complete these routine tests more quickly and satisfactorily than the chemist who taught him, first because he is thoroughly familiar with the procedure and dare not deviate from it, and second because his mind is not considering other possible methods of procedure. In addition, he is more satisfied to do routine analytical work than is a man trained as a chemist. The latter sees the many possibilities of a chemist, and chafes at the tediousness of routine work. The routine analyst should be recognized in his field, but should have no recognition except in that line, nor should he be allowed to sign reports or to pass as an expert, either in consultation or legal proceedings.

It would seem that employees in laboratories should be graded into three classes: chemists, who should be college graduates, with a thorough chemical training; analysts, or people who have been taught to make certain tests but who lack the theoretical background of the college graduate; and untrained assistants, such as clerks, stenographers, cleaners, etc.

The minimum rates of pay of the employees could be based on such a classification and might be $35 for chemists, $20 for analysts, and $12 for other assistants. Hours for all classes might well be the same: a 40-hour week with no employee working more than 54 hours a week, and the 40-hour average to be maintained over a three-month period.

The code should, of course, include a provision prohibiting child labor.

THERE is still a further provision which might well be included in such a code although ultimately the matter might well be handled under a system of state licenses and that is that no certificate of analysis shall be recognized unless the chemical work it represents has been performed under the direct supervision of a graduate chemist and the certificate is signed by such a chemist. Such a certificate would not be necessary from any laboratory which is making analyses only as a means of factory control on materials in process of manufacture, whether the laboratory is owned by and operated for the one manufacturer, or is privately owned and serving many manufacturers. This provision would immediately apply however to the analysis of products which are sold by the manufacturer. Under NRA, this provision might have to be limited to the analyses of products which enter interstate commerce, but ultimately by a system of state licenses under some such arrangement as has been formulated by the Certified Public Accountants, it might be possible to control the testing of all products entering commerce.

Such "referee" certificates of analyses should never be issued, we believe, unless the person in charge of the laboratory issuing the report is a trained chemist with not less than four years of college work.

NRA and the Chemist

A NUMBER of tentative codes have come into the office of THE CHEMIST; and by the time this issue is in print, the code of the chemical industry will already have been presented in Washington.

We go to press too early to include Charles C. Concannon's speech on "NRA and the Chemist," delivered before the New York Chapter; but we shall include this speech in the next issue, as well as other material on this important subject.

BY-PRODUCTS

Random Thoughts on Professional Organization

SOME time ago we contemplated writing a paper on professional organization for chemists, and to that end began collecting material and jotting down our thoughts. We soon discovered that we had undertaken something that was likely to run to inordinate length. When we got thoroughly into the theory and philosophy of professional organization, we saw that no self-respecting editor would grant us the space that seemed likely to be required. So, we compromised and instead of weaving our ideas into a coherent, if lengthy, whole, decided to present them in their virginal fragmentary forms, trusting the intrepid reader to fill in the rhetorical gaps.

* * * * *

What of the future of the chemical profession? We are one of those who believe that experience points to the conclusion that future conditions are, to a large extent at least, determinable by voluntary action in the present. After careful study of the arguments presented by the helpless and hopeless school that postulates fatalism, we have decided against it—although we acknowledge a certain romantic temptation in its irresponsibility. Those hardy readers of ours who still have control of their tempers will then agree with us that the future of the profession of chemistry, which is to say the lives, happiness, and serviceability of future chemists, may be and indeed will be profoundly influenced by the actions we today decide to take.

We have a certain responsibility that cannot be avoided or transferred. When we decided to enter the ranks of our profession, we assumed obligations to the profession, just as everyone assumes certain social obligations when he is born into a community, obligations he cannot escape regardless of his personal opinions in the matter. We are conscious that many chemists do not believe they owe any obligation to our profession and are not concerned about the future conditions of chemistry and chemists. This is merely a state of ethical deaf-dumb-and-blindness and does not prove anything more than those men are abnormal.

If you will grant the ability and the responsibility to influence the

future state of our profession, the question then arises, how are we to do this? The answer requires a clear conception of the perfect state of the chemist. No ideal less high would be worthy of our efforts. Not that we could hope to make that ideal real, for we could at best only approximate it, and we know that with ever shifting social and political equilibria in the community the ideal itself and the *modi operandi* would need modification to adjust them to changed conditions.

What the ideal condition may be and how best to proceed to establish it are matters to be decided by the counsel of all chemists. To provide a forum in which these questions may be debated and an agency by which the plan evolved may become operative, there is needed a professional organization that is primarily devoted to the humanistic relations of the chemist.

Why should professional men organize? The argument contra based on individualism runs something like this: "Scientific advance is the result of the creative genius of individuals working alone. Even in those cases where a number of specialists are united to solve a problem, the idea that is new is always the contribution of one person, though it may be suggested or stimulated or modified by the others. One cannot replace individual creative genius by mass-effort. Indeed, no surer method for repressing genius has ever been found. Grief, despondency, disappointment, even the stake and fagot cannot eradicate the creative ethic, but mass-effort can blight it quickly and effectively. Consider a thousand Egyptian slaves straining at the ropes, painfully dragging 400 tons of obelisk over the Lybian sands and smarting under the lash freely applied by the sub-foremen. Where is the opportunity for the creative genius among that panting crew? Who is there to encourage and foster new ideas? Mass-action means loss of individuality through dissipating the consciousness of individuality."

The obvious refutation of this argument is that professional organization cannot lead to the type of mass-effort deprecated in the preceding paragraph. On the contrary, it serves as a stimulus to creative effort by furnishing an atmosphere in which the special problems of the group are being discovered, analyzed, and translated into action. Individualism is at a premium in such an environment.

An organization is the expression of the common ideals of its members. Men who cherish similar principles find that by uniting their efforts the force they are able to impress upon a situation is greater than the mere arithmetical sum of their individual efforts. An organization concentrates the individual forces much as a lens focuses radiant energy and combines the feeble single rays into one vector of intense power.

An organization is primarily active, affecting the lives of its members either internally by education and culture or externally by modifying the communal conditions that limit them. The power of a few individuals to alter the trend of world conditions is negligible. What one or a few men think about conditions is futile until it is translated into action; and the effectiveness of the action is proportional to the human energy behind it.

* * * * *

Debris is unorganized.

* * * * *

Perhaps it may be urged that conditions change in obedience to some law of nature that operates in perfect independence of human interference, and that for this reason organization to control or at least to influence the character of the change is useless. The members may delude themselves with the chimera of effectiveness, but no real effect occurs. This is the position of determinism; and if it be true, everything is equally futile, and there is no rational excuse for effort of any kind.

If we know anything, we know that there is an abundance of evidence to support the thesis that men can, by their efforts as individuals and more efficiently by organized action, change the course of events in the future toward some ideal end. The fact is there. It may be merely illusion, but if it is then so is everything else, and illusion cancels out and becomes meaningless.

It would, of course, be irrational to argue that all organized effort is successful. Success requires more than mere banding together or even harmonious action. The goal of the organization and the means employed in realizing it must be consistent with the general forces in operation. They cannot be cross or opposing currents. It will not do to demand unmerited conditions or to adopt antagonizing methods. But what is a just demand and what a legitimate method?

In those cases where there may be no certain answer to these questions, the decision becomes a matter of judgment. Here again organization is of value because it multiplies the shrewdness of single individuals and makes for greater wisdom in action. Not that the majority is always right; it can be, and frequently is, wrong in its decisions; but by and

large, it is safer than minority or individual control and is safer in proportion to the mobility of the principles that actuate all participants.

* * * * *

Scientific men are commonly unversed in the art of dealing with public opinion. Their training is of quite another kind. To carry conviction they offer demonstration, as nearly as possible along mathematical lines. They are not trained to persuasiveness, to appeal to the emotions, to play upon the moods of the crowd. Yet something of this ability is required if we are to combat those anti-scientific movements that occasionally appear and whose proponents are distinguished in these arts. The accomplishments of Huxley in converting lay and scientific England to the Darwinian doctrines was due quite as much to his forensic skill as to the validity of his evidence. And something of this ability will be required if we are to win for the chemist his proper place in the community, whatever that place may be. Professional organization brings to light (and furnishes opportunity and incentive to) men of executive and administrative ability; the support of the organization develops these men, and they become the champions of the organization's ideals. Other members in the organization, not talented in those particular directions, may then leave the actual execution of plans to these men and go about their own private affairs.

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The desirability of some concerted action, and so for a professional organization, is so apparent as hardly to require comment were it not that a large number of chemists seem unable to comprehend it. Although very few of these men would assert complete satisfaction with present conditions, they seem to think that things will eventually right themselves if let alone to drift unmanaged. But processes left to run their natural course always arrive at a state of minimum free energy and maximum entropy, which is to say the lowest possible level of effectiveness Men can and do lift themselves by their own bootstraps. The history of civilization is a continuous record of that manoeuvre, and the declines of various ancient civilizations may be traced directly to the abandonment by a whole people of the willingness to practice it.

Chemists are just as subject to the law of social gravitation as any other group of professional men; and until they recognize that such a force is operating and adopt the obvious remedy, the profession as a

whole will fall behind the procession and make the remedy just that much more difficult to apply at some future time.

* * * * *

Were we living in an age of general individualism in which each man's position depended upon his own merit, the need for professional organization would be less acute. We are not living in such an age. Today everything is organized, and the tendency of history is the resultant of the various pressures brought to bear by the various organizations. Any group that lacks an organization proportionately powerful to its relative size in the community is failing to influence that tendency, and the failure may result in catastrophe to the group. The course of events is not being directed toward "the greatest good of the greatest number." Efforts in that direction, while apparent, are weak compared with influences based upon selfishness and indifference to the rights of others. Most men must have the incentive of not-too-long-delayed personal reward before they will devote time, energy, money, and thought to an enterprise. This may be considered a base standard, but it is characteristic of modern, and past, conditions and must be taken into consideration.

Be selfish, then? Frankly, yes, but only so far as may be necessary to stalemate counter-selfishness. Be selfish in the manner of the attorney acting for his client, who seeks to present his case in its most favorable light and to deprecate the opposing case. The law provides a judge to weigh the merits of the contenders; the body politic provides public opinion which, while not always judicial, is nevertheless amenable to the appeal of merit.

The point of merit should be emphasized. No organized effort can be permanently successful unless its purposes and ideals can be defended as meritorious. They must be consistent with the best aspirations of our civilization. Anything inconsistent with those aspirations will eventually be eradicated by the irresistible progress of civilization. Grasping cupidity, avarice, or any other such vicious passion apparent in the demands or methods of a group sooner or later provoke overwhelming opposition. A sense of fairness is sufficiently common to the human race to make for public antagonism to movements based on unjustifiable, not to say unethical, motives and eventually to support worthy projects. If we are to be selfish we must make sure that our selfishness is enlightened and not such as to arouse public hostility.

—*The Autocratic Chemist*

Chemical Relics

By Charles H. LaWall

A fine historical collection. Great events of early chemistry. Some chemical curiosities.

ON THE first floor of the Hall of Science at the Century of Progress Exposition in Chicago is an exhibit which is of interest to chemists. It is called the "Medieval Pharmacy and Faust Study," and it occupies two spacious rooms of the professional exhibit of E. R. Squibb and Sons, who last winter purchased the world's greatest private collection of ancient pharmaceutical and chemical antiquities and who have placed a portion of it on display in Chicago.

There was a close interrelationship between pharmacy and chemistry up to very recent times. Chemists sometimes forget that the great Scheele was a humble small-town Swedish apothecary who made his numerous and significant discoveries in a poorly equipped improvised laboratory in the rear of the pharmacy of which he was the manager and some chemists may therefore be surprised to find many items of chemical interest in the Chicago display of antiquities and curiosities.

The alchemistic fireplace, in the Faust study, has been faithfully reproduced from illustrations. On the mantelpiece over the hearth are a number of specimens of Venetian laboratory glassware dating from the 15th century. Flasks, retorts, alembics, and receivers, of varying sizes and shapes, are represented while the hearth itself is strewn with trivets, marmites, casseroles, crucibles, etc., of great antiquity. Ancient lighting fixtures, several centuries old, are also on exhibition, as well as early drug mills, microscopes with wooden draw tubes and wooden bases, and many other equally interesting curios.

In the pharmacy proper, and scattered in display windows, is a large collection of very valuable mortars, the oldest specimen being a beautifully carved marble of Roman origin. The oldest metal mortar is dated 1411, but there are dozens of bronze, brass, and iron mortars of the 16th, 17th, and 18th centuries—of Russian, German, Flemish, Dutch, French, Italian, Spanish, and Moorish origin.

The ancient pharmacy also contains examples of earthenware and majolica, containers of great beauty as regards form and coloring, and

representing four different centuries and a half-dozen countries in their age and origin. In the section where the smaller glass bottles and wide-mouth jars are found, the chemist who is even slightly familiar with the history of his profession will revel in the display of alchemistic signs and symbols which were in use many centuries before our present system of chemical shorthand was devised, and when there were believed to be but four elements: earth, air, fire, and water.

A circle bisected by a horizontal line was the symbol for a "salt;" an inverted triangle was employed for a "water;" a sign somewhat like the Greek letter Omega stood for a "spirit;" and a symbol like the trademark of the Uneeda Biscuit Company meant "pulverized." Sulphur was represented by a triangle surmounting a plus sign, and tartar was symbolized by a horizontal rectangle over a plus sign. The familiar symbols of most of the seven ancient metals with planetary associations—gold, silver, copper, iron, tin, lead, and mercury—are to be found in the collection, as well as the more complicated symbols for vitriol and ammonia.

HERE, too, we meet such out-of-the-way and archaic names as "pompholyx" for zinc oxide; "sal mirabile Glauberi" for sodium sulphate; and "sal polychrestum" for either potassium sulphate or Rochelle salt. The confusion in this last case was due to the rivalry between the original manufacturers of each of these chemicals. Each was sold as a secret nostrum and panacea, the name "sal polychrestum" meaning "a salt of many virtues." These were the days before analytical chemistry had been developed to any great extent; and so important was the announcement of the French pharmacist Geoffroy that he had learned the composition of the Rochelle salt variety of sal polychrestum, that his paper was read and gravely discussed before such august and important organizations as the French Academy of Sciences and the Royal Society of Great Britain. There was a reason for this interest, however, in the fact that the family of the original discoverer of this salt, Peter Seignette, of Rochelle, France, had enjoyed a monopoly of its manufacture and sale at a high price for nearly sixty years.

There are other curious, uncommon labels in this collection, reminding us of the odd remedies in which the medical practitioners of that time placed their faith. We find elks hoofs; capon water, made by distilling stewed capons; oil of earthworms, made by infusing angleworms in a fixed oil; swallow water, made by suffocating fledgling swallows and then subjecting them to distillation; spirit of hartshorn, actually made

by the destructive distillation of the horns of the hart-deer; and spirit of ants, an early preparation of formic acid, made from red ants.

But we have rambled too long, perhaps, over the shelves of this unique collection. We hope that the firm responsible for this stimulating of interest in things historical relating to pharmacy, medicine, and chemistry will find an appropriate permanent location for their unusual collection after the Century of Progress Exposition has closed its doors.

Possibilities in Fermentation Work

By C. A. Nowak

Small breweries need chemists. Control and research work in the fermented liquor industry.

THE return of beer and the possible repeal of the 18th Amendment have brought the brewing industry to the foreground; and as a result of my intimate connection with this industry for a period of twenty-three years, I may be able to offer some opinions which will be of interest to the readers of THE CHEMIST.

It is not my intention to make wild guesses as to what will happen within the next year, but merely to touch upon the possibilities in brewing for the graduate chemist who has specialized in microscopy, bacteriology, colloidal chemistry, and fermentation.

While the brewing industry never lacked practical men, brewmasters capable of various degrees of accomplishment, it never appreciated as a whole—and up to this time still fails to appreciate—the value and im-

portance of a chemist, trained as suggested above, as a member of the plant personnel. It is true that commercial laboratories specializing in fermentation work are located in the larger and more important cities and will always have a definite function to perform. It is doubtful, however, whether these commercial laboratories can take care of the smaller brewing plants widely scattered throughout the country. As a rule the smaller plants cannot afford to pay the high salaries of the larger ones, and therefore cannot expect to buy the services of a highly trained brewmaster or of a superintendent capable of doing his own laboratory work.

The nature of brewing is such that it should be constantly controlled. We brew once or twice every day; and it is at least two weeks before we can see what our product is going to be like. Daily laboratory control is therefore imperative. Otherwise, it may happen that at the end of the fourteen days we find in our cellars the result of two weeks' accumulated brews infected or contaminated so as to make the product unfit for sale.

The loss incurred by a brewer who places on the market an inferior beer, which the consuming public refuses to accept, is usually so great that it would have bought for him the services of a capable young chemist for several years.

There is another way in which the average brewer can profit by having his own chemist. He can purchase all of his materials on the basis of specification; he can treat his own brewing water according to the analysis; and the chemist can compound the proper ingredients. The chemist can also control the making of experimental brews for the purpose of improving the product.

Finally, the brewing industry offers an unlimited field for research. Almost nothing has been done in the United States for the last fourteen years; and in spite of the researches abroad there still remain many problems which cause the brewer immeasurable grief, problems which appear relatively simple but which up to date remain unsolved.

Unemployment Committee

By M. R. Bhagwat

Report of the Committee. General employment conditions. Fundamental research. Other activities.

THERE appears to be a marked activity in the employment of junior chemists; and in a few instances recent graduates were also considered. Our experience at this office leads us to believe that chemists and chemical engineers with extended experience will find it very difficult to secure positions for at least several months to come. We also find it a great problem to get jobs for unemployed men around 50 years of age or over. Practically all of these individuals earned from $3600 to $25000 per year in normal times. The resources of some of these men have become exhausted with continued unemployment. The next, but equally important problem, is that of guiding recent graduates and post-graduates.

We are very happy to present the following progress in the fundamental research program sponsored by this committee. The following projects were taken for investigation during the last eight months:

1. Investigation of A.B.C. proteins of fish lenses.
2. Study of products from castor oil.
3. Diamagnetism of water at various temperatures.
4. Study of diffusion cells.
5. Graphical presentation of principles of fractional distillation.
6. Toxicological effects of compounds related to barbituric acid group.
7. Study of chrysene and its derivatives as factors in producing cancer.
8. Study of chemical constitution and physiological reaction—cholines and other quaternary ammonium salts and their derivatives.
9. Effect of various concentrations of certain chemicals upon the growth of *B. Coli* and inhibition of *B. Aerogenes*.
10. Principles and laws governing grinding and particle sizing.
11. Ceramic properties of talc.
12. Application of high-speed rotating cathode.

The latter six projects are still being continued.

From the funds contributed by the members of the profession, we have been able thus far to help 55 families either by made-work relief or loans.

In addition to handling relief and employment, the committee has served as a helpful agency in the following:

1. The members of the committee were called upon to give information regarding manufacturers and persons engaged in definite chemical endeavors by sales representatives coming from foreign lands.
2. Contact has been maintained with the Travellers' Aid Society, and help was given to such families of chemists and chemical engineers as were stranded in this area and as were desirous of bettering their position by going to other parts of the country.
3. Through the cooperation of several technical publications in the greater metropolitan area, free space for advertising the records and experience of unemployed chemists and chemical engineers was obtained. To date, 84 free advertisements have appeared.

The members of the committee are desirous of maintaining statistical information related to the strength of the chemical profession, the number of manufacturers, the fluctuation in unemployment, etc. These statistical figures are difficult to obtain unless industries and the individuals working in them cooperate with the committee. Moreover, work of this type is fairly expensive, and hence no vigorous action has been taken in this direction. It is very essential, however, that employers use the committee as a source for their prospective employees. We have on our files complete classification of the records of all chemists and chemical engineers registered with the committee and are therefore in a position to select the proper men for the jobs in view.

The future program of this committee is still to be ascertained in the fall. Until then, this organization will do its very best to serve the profession as it has done in the past.

BOOK REVIEWS

Chemical Refining of Petroleum. By VLADIMIR A. KALICHEVSKY and BERT ALLEN STAGNER. American Chemical Society Monograph Series. *Chemical Catalog Company.* $7.00.

The technical and scientific literature of petroleum has developed in recent years to the point where an occasional monograph such as the present one is certainly to be welcomed. In the memory of men not yet very gray, the chemical refining of petroleum was practically limited to treating with more or less sulfuric acid in an air-blown agitator followed by a water and alkali washing operation. Refining was an art, and a rather crude and empirical art. Sulfuric acid is still the most used refining agent and though the chemistry of its refining effects is not yet fully known, petroleum refining may now fairly be considered as a science rather than an empirical art.

The haunting specter of most scientific and technical writers is no doubt the fear of including too little, or too much. The author must be qualified to use a severe editorial discrimination. It is nearly always easy for a reviewer to attack a volume for its sins of omission or commission. Those who burned the Alexandrian library were probably book reviewers or literary critics. Emerson once said that one must have a very strong mind to withstand too many books, a remark that applies at least equally well to the reading of technical literature, particularly patent "literature." The present monograph, however, appears to be a very well-balanced presentation.

A large part of the subject matter of the present monograph has not heretofore been brought together in convenient book form. This is particularly true of the chapters on refining by adsorption, the use of solvents other than sulfur dioxide, oxidation and the use of inhibitors. Where the subjects discussed do not fall within the experience or first-hand knowledge of the authors or where there may be considerable doubt as to the alleged facts, the reader is given the cue by the use of such polite phrases as "It is said that," or "One patentee claims," and the like. Sifting the wheat from the chaff is a difficult job, particularly when there is so much chaff as there is in the technical literature of petroleum.

It is a relief to have a work on petroleum technology not burdened

with much historical matter lifted from the quaint old "treatises" of an earlier day, or loaded with quasi-legal discussions of cracking processes. However, there are seventy pages of material in the appendix, including a supplementary list of patents on petroleum refining, a few tables and charts and a glossary of terms which are of very doubtful value. Anyone who needs the explanation that lye is "an aqueous solution of sodium or potassium hydroxide" or that milk of lime is "a suspension of calcium hydroxide in water" will probably wonder what those "hydroxides" are, and probably would be better off if he did not attempt to read this or any other book. However, there is more than enough good, well-edited material in the work to warrant its inclusion in every library of petroleum technology, large or small. B. T. Brooks

Evaporating, Condensing, and Cooling Apparatus. By E. Hausbrand, translated from German by A. C. Wright, and edited by Basil Heastie. Fifth edition. 503 pages. *D. Van Nostrand Company.* $8.00

The appearance of the fifth English edition is good evidence that the material in this book has been serving a useful purpose in assisting engineers in the design of equipment covered by the title. Those responsible for this work seem to have been more successful than the average writers in coordinating theory with practice on the numerous problems affecting heat transfer and the efficient design of heat-transfer apparatus.

While there is a relatively small amount of new material in the last edition compared to the earlier editions, the new comments in chapter 19 on heat losses, formulae for calculating these losses, and methods for minimizing them are interesting. Out of the total of 28 chapters there is an entirely new one on modern industrial practice in heat exchangers which embodies some of the more recent additions to the literature. Some corrections have been made in other chapters and tables, and formulae have been modified to incorporate data based on modern developments.

Some features seem to have been overlooked in bringing the volume up to date. The decided trend toward the use of steam-jet vacuum equipment which has been so noticeable during recent years for maintaining vacuum on condensers and evaporators is ignored entirely, and all illustrations and comments on vacuum equipment include only mechanical vacuum pumps. A volume that deals primarily with evaporators and condensers would be more complete if it called attention to the fact that recent improvements in the design of steam-jet

vacuum equipment have resulted in its being used on the big majority of all condensers and evaporators installed during the past few years. This trend is not so noticeable in Europe, and it is not surprising that mention of it was omitted from the original German edition. However, all editions of the book include a substantial amount of data from American practice, and the improved efficiency and simplicity gained by the use of steam jets seems to be important enough to warrant discussion in a work of this kind. The use of steam jets in the recompression of steam for evaporators is covered quite well, although the figures given for performance and efficiency are not up to date.

For the benefit of those who are not familiar with the earlier editions, it should be said that this volume covers the design and operation of equipment in a very thorough and practical manner. Included are numerous tables which make it very convenient to determine proper sizes of various parts of the equipment, velocities of the fluids at different points, and other useful design information. Along with this and other practical information, there are numerous theoretical discussions presented in more logical and understandable fashion than one usually finds in this type of literature. These discussions are accompanied with hundreds of formulae, with comments on the derivation and application of most of them.

D. H. Jackson

Positions Open

Letters of application for the following positions will be forwarded directly to the companies concerned.

1FP A large chemical corporation is looking for a chemist who has had experience in both the designing and working of solvent recovery plants. He must be not over 35 years old.

2FP Chemical engineer wanted. With 5-10 years' experience on varnishes and paints.

INSTITUTE NOTES

National Council

The one-hundred and third meeting of the council was held at The Chemists' Club, on Thursday, June 15, 1933, with President Henry C. Knight presiding. The following councilors and officers were present: Messrs. Crossley, Morgan, Neiman, Taggart, Zons, and Miss F. E. Wall.

Dr. Crossley submitted the report of the budget committee, and upon motion made and seconded, the budget was approved and accepted.

The following new member was elected:

FELLOW: Arthur Jere Norton, *Chemical Director*, General Plastics, Inc., North Tonawanda, N. Y.

Raised from Juniors to Associates: George R. Gray, Frederick W. Kinard.

Mr. Cayo was appointed chairman of a committee to sponsor a chapter in southern New Jersey.

The following committees were appointed:

PROFESSIONAL EDUCATION: M. L. Crossley, *Chairman*, R. A. Baker, A. J. Hill.

ETHICS: F. G. Breyer, *Chairman*, E. F. Cayo, F. E. Wall.

QUALIFICATIONS: H. S. Neiman, *Chairman*, F. W. Zons, W. L. Prager, J. W. H. Randall.

CIVIL SERVICE: Frederick E. Breithut, *Chairman*, Frederick Kenney, Horace T. Herrick.

LEGISLATION: August Merz, *Chairman*, Allen F. Odell, Howard S. Neiman.

MEMBERSHIP: D. D. Jackson, *Chairman* (with the request that he appoint the remainder of the committee).

CONSTITUTIONAL REVISION: Lloyd Van Doren, *Chairman*, Florence E. Wall, Karl M. Herstein.

INSURANCE: M. L. Crossley, B. T. Brooks, D. P. Morgan.

REPRESENTATIVES TO THE C. U. C.: F. G. Breyer, W. J. Baëza.

The suggestion of Mr. Gordy that the Institute offer free publicity service to the members in connection with their personal announcements, publications, talks, etc., was adopted.

HOWARD S. NEIMAN, *Secretary*

Niagara Chapter

The fourth regular meeting of the Niagara Chapter was held on August 19th at the summer home of Dr. and Mrs. Arthur W. Burwell near Wilson, N. Y., on the shores of Lake Ontario. Eight members were present, with their wives.

The afternoon was spent by the members and guests in availing themselves of the privileges of the location, swimming and boating, followed by a picnic supper at 6:30 P.M.

The chairman reported receipt of a letter from President Knight with respect to the summer meeting of the Chapter.

The chairman read a revised list of committee personnel and indicated several pertinent duties for each committee. It was suggested that any extensive projects be separately budgeted.

The next meeting was announced for November at Hotel Touraine, Buffalo.

It was moved by Dr. Burwell, seconded by Dr. Cartledge, that the secretary be instructed to draw up a suitable letter and send it to John F. Williams expressing the regret of the chapter at the severance of his membership due to transfer to New York City. Motion carried unanimously.

The discussion of the evening centered on "Professional Ethics." The membership of the chapter had been made acquainted in a general way with the code of ethics formulated by the national organization of The American Institute of Chemists, but it was felt that if these principles were in some manner correlated to actual facts and to occurrences in the everyday life of the Niagara Frontier, they would mean more; and food for serious discussion would be presented. Accordingly three members were asked to give instances from their own personal observation. Following these three short talks there was general discussion.

Charles F. Smith pointed out that oftentimes a chemist finds himself in a tight place and is honestly in doubt as to the proper course to pursue, but that it must not be supposed that all cases are open to the same sort of reasonable doubt. One man, in charge of a secret process, later quit and patented it himself.

Chemists are powerful influences in the purchase of materials; here all extremes have been found. Some will not accept even the smallest gift from the salesmen; and some hint at the outset that nothing gets by them unless accompanied by something to "oil" the purchasing agent. This is sometimes done in a rather guarded manner. One chemist claimed he had developed a new product; and the seller (not his employer) paid him a royalty until it was discovered that all he had done was to carry out some rather common-place development work on the material.

How honest should the chemist be? Some limit honesty to not stealing from an employer and stop it short of telling the customer all about the product. Should the customer be told all about the product? Should he be told facts. true in themselves, which have no bearing on the use to which he intends to put the material?

This same question may be applied

to the chemist on the witness stand. Should he tell all he can, or if not, where should he stop? Consensus of opinion, expressed during the discussion, was that an expert on the witness stand has the right to talk until he has finished his story, unhampered by counsel. As for telling the customer too much or too little, specifications should include the statement that "for this purpose our product is superior," etc.

Maurice Taylor told of a case in which the employee contracted with a firm through the employer, then tried to collect a fee as an individual. This brought up the question of the lengths to which an employee is privileged to go in independent consulting work, while working for an employer on salary. The safest way seemed to be to report all such opportunities to the employer and get permission first. This is almost never refused.

Arthur W. Burwell heartily endorsed some of the suggestions already made, crystallizing them into the phrase "avoid even the appearance of evil," both as a matter of ethics and of policy as well. Making the employer a confidant with respect to outside consulting opportunities engenders confidence in return. Otherwise there is a suspicion that the wish to obtain the work outweighs the desire to be square.

Howard W. Post, *Secretary*

NEWS

New Extension Course

The extension division of Brooklyn College is offering this year a new course in the principles of electrochemistry and photochemistry. The course has been arranged for chemists, engineers, and technical employees, and for teachers of science in the New York City high schools, and will consider the principles underlying electrochemical and photochemical processes used in industries, together with methods of manufacturing representative products.

Harold W. Coles has been appointed to the E. R. Squibb fellowship at the Mellon Institute, to continue the pharmaceutical research of the fellowship. Dr. Coles is a specialist in the pharmacology and physiology of local anaesthetics.

M. L. Crossley, F.A.I.C., is the Institute representative on the educational committee of the exposition of Chemical Industry. Other Institute members on the committee are **C. R. Downs, B. T. Brooks, Ross A. Baker,** and **Neil E. Gordon.**

John M. Ort, F.A.I.C., has joined the research staff of E. R. Squibb & Sons.

Kenneth G. Chesley, F.A.I.C., has accepted a position with the Crossett Chemical Company, Crossett, Arkansas.

Henry Arnstein, F.A.I.C., is engaged in the construction for the Uruguayan government of two large alcohol plants, one to make gins, whiskeys, liqueurs, cognacs, etc., the other to produce absolute alcohol for industrial and motor-fuel purposes.

Latest governments to make the use of alcohol-blended fuel obligatory are those of El Salvador, Panama, and Uruguay.

Dr. Arnstein will construct similar plants in South Africa, in this case for a private company.

Francis P. Garvan has been appointed industrial adviser for the code hearings of the chemical manufacturing industry.

William Foster, F.A.I.C., has been named Russell Wellman Moore Professor of Chemistry at Princeton. Professor Foster is the author of seven books and many articles; and he has adapted chemistry to the uses of archeology, particularly by analyzing the glaze on Greek vases.

William A. Hamor, F.A.I.C., is the author of an article on "Business Improvement Through the Human Sciences," published in the *Record*, publication of the University of Pittsburgh.

Benjamin Janer, F.A.I.C., president of the Association of Municipal Chemists, addressed the Ariston League of the Lewis Avenue Congregational Church on "The Chemical Laboratory—Its Place in the Administration of the City's Business."

Resin Laminating

Recent investigations at Mellon Institute have resulted in the adaptation of "Robertson-Bonded-Metal" to the needs of the resin-laminating industry. The new material facilitates the manufacture of decorative resin finishes.

The fiber-coated metal offers ideal anchorage for resin adhesives and results in a bond 45 per cent stronger than is given by present methods of attachment to etched steel.

It has been found possible to substitute a layer of "R-B-M" for part of the fabric or paper layers in laminated resins, thus giving a laminated sheet with a steel core. The metal may be used to supply all the desired strength, with a thin veneer layer for decorative purposes only.

A. Richard Bliss, Jr., F.A.I.C., has resigned his position as chief of the division of pharmacology of the University of Tennessee to become director of the research laboratories of the William A. Webster Company, of Memphis.

The new Webster laboratories will be housed in a $20,000 addition to the present plant; and the selection of Dr. Bliss as director resulted from the feeling of the company that the manufacture of medicinals laboratory needed the supervision of "a scientist well trained in chemistry, pharmacology, toxicology, and experimental medicine."

The Memphis *Commercial Appeal* commented that "academically Dr. Bliss is one of the best fitted men in his particular field in the country. Memphis is fortunate in that he intends remaining here in a professional capacity with one of its leading industrial firms."